Log Event A

Borehole 40-02-04

Borehole Information

Farm : S	**Tank :** S-102	**Site Number :**
N-Coord : 36,186	**W-Coord :** 75,722	**TOC Elevation :** 663.00
Water Level, ft :	**Date Drilled :** 3/13/1952	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 150	

Borehole Notes:
According to the driller's records, this borehole was perforated but not grouted. The casing was perforated between 40 and 100 ft. The top of the casing (the zero reference for the SGLS) is located on a berm that is approximately 2 ft above the tank farm grade. The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

The logger's notes record that the casing is a 5-in.-inside-diameter pipe. However, the driller's log and Chamness and Merz (1993) indicate the borehole was completed using 6-in. casing. It is possible a smaller-diameter casing was attached to the top of the borehole. A correction factor for a 6-in. casing was used to process the data acquired from this borehole.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 04/1996	**Calibration Reference :** GJPO-HAN-5	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 05/23/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 0.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 21.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 05/24/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 144.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 20.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Analysis Information

Analyst : S.D. Barry

Data Processing Reference : P-GJPO-1787 Analysis Date : 02/19/1997

Analysis Notes :

This borehole was logged in two log runs. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications. The energy calibration and peak-shape calibration from these spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The only man-made radionuclide detected around this borehole was Cs-137. The presence of Cs-137 was measured continuously from the ground surface to about 9 ft. The maximum Cs-137 concentration was 36.8 pCi/g at 0.5 ft.

The K-40 concentrations begin to increase at about 48 ft. Between 49 and 57 ft, the Th-232 and U-238 log plots show a region of elevated concentrations. Beginning at about 60 ft, the K-40 and Th-232 concentrations increase. Beginning at about 128 ft, the U-238 and Th-232 concentration values begin to increase.

The change in the U-238 concentration values at 20 ft is associated with the change in log runs. The change is probably because of radon venting up the borehole. The 609-keV spectral peak that is used to calculate the U-238 concentration is only accurate if the Bi-214 and U-238 are in secular equilibrium. Because radon gas is an intermediate member of the U-238 decay chain, the equilibrium condition will be disturbed along with changes in the weather conditions in the vicinity of the borehole, and the concentration of the Rn-222 in the borehole does not necessarily remain constant between log runs.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank S-102.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.